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### ENERGY AND THE ENVIRONMENT (EE)

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# AUTHOR INDEX


## A

**Abrahams, C. D.,** Impact of Building and Fire Codes on New Clean Room Construction, No. 5, p. 36. *Addresses the major issues that have to be dealt with in existing and new building designs. The Semiconductor Industry Association is spearheading the development of new building and fire codes to establish acceptable safety standards for the design and operation of buildings where hazardous production materials (HPM) are stored, distributed and utilized. The impact of these codes will be felt by all operations where HPM are utilized.* (CC Criteria and Standards, Clean Room Design, Materials)

**Adams, F. G.,** A Unique Use for Quasi-Random Vibration for Wire Panel Production Screening, No. 5, p. 24. *Describes a cost effective method of vibrating wire panel assemblies over a large size and weight range at the Hughes Aircraft Company's Ground Systems Group (GSG) Manufacturing Division. The approach uses pneumatic vibration and special vibration fixtures; two types of vibration table for small to intermediate panels, and an "I-Beam" clamp-on fixtures for large panels. The procedure is used for: (a) debris removal in the wire wrap or termi point wiring areas, and (b) screening for manufacturing workmanship defects on these panels. Results indicate that the screen, conducted at approximately 2 grms, is effective in removing debris likely to cause trouble later in the test program or in the field.* (DTE Shock and Vibration; PR Stress Screening)

**Auser, W. D.,** Cosmetics in Clean Rooms, No. 5, p. 27. *(Abstract—see Phillips, Q. T.)*

## B

**Baker, E. J.,** Personnel Training for Precision Cleaning of Aerospace Hardware to MIL-STD-1246A Levels, No. 2, p. 38. *Stringent particulate contamination levels for aerospace hardware demand a comprehensive training program for operators and inspectors of precision cleaning processes. To meet these demanding requirements, Lockheed Missiles and Space Co., Inc. has developed a unique training program in which diverse precision cleaning, hardware sampling, and verification techniques are presenced with a strong "definitive/explanatory" approach. The training leads to personnel certification as precision cleaning operators or inspectors upon successful completion or both a written and oral examination. The success of this program is measured by the high degree of proficiency, confidence, and motivation evidenced in those who have completed the program and the improved quality and reliability of the hardware being produced.* (CC Training/Education)

**Baldwin, M.,** Cosmetics in Clean Rooms, No. 5, p. 27. *(Abstract—see Phillips, Q. T.)*

**Bansal, I. K.,** Control of Surface Contamination on Silicon Wafers in the Semiconductor Industry, No. 4, p. 20. *Compares the degree of particulate contamination on silicon wafers by employing (a) semiconductor or electronic grade chemicals, (b) low particle-count chemicals, (c) semiconductor grade chemicals with point-of-use filtration, (d) low particle-count chemicals with point-of-use filtration. A dark field/phase contrast microscope and laser operated Tencor Surfscan™ were employed to measure the surface contamination on the silicon wafers. Comparative particle-count data are also described for the "open" wet immersion bath and "closed" FSI cleaning systems. Particle-count data for deionized water. Three commercially available particle counters are also discussed.* (CC Filters/Filtration, Identification/Measurement)

**Beck, B. L.,** Personnel Training for Precision Cleaning of Aerospace Hardware to MIL-STD-1246A Levels, No. 2, p. 38. *(Abstract—see Baker, E. J.)*

**Bettini, R. G.,** Simplified Multilayer Insulation Pumpdown Calculation Approach, No. 2, p 47. *During launch, or simulated launch, of space vehicles such as NASA's Space Telescope, pressure within Multilayer Blankets must decay from atmospheric to minimum effective operational ($10^{-4}$ torr) levels rapidly to prevent excessive cooling of insulated hardware during venting time. This evacuation rate is a function of ambient pressure decay rate, number of shields, enclosed volume, venting area, initial temperature, and trapped gas. A simplified computer simulation that estimates blanket internal pressure during an isentropic evacuation as a function of the above variables is presented. Analytical predictions are compared to test data to confirm the reasonableness of this approach.* (DTE, Solar/Space Simulation)

**Bettini, R. G.,** Precision Thermal Contrcl Test Demonstration on Simulated Space Telescope Main Ring, No. 4, p. 17. *Space applications require precision thermal control on functional hardware to maintain critical dimensions, thereby minimizing changes in these dimensions in operational environments. An example is the space telescope's main ring assembly, which holds the primary mirror, the secondary mirror truss assembly, and the instrument support structure. Describes how a simulated portion of the main ring was fabricated and tested to determine whether thermal stability could be maintained in a complex structural assembly. The test confirmed the effectiveness of the highly-insulated, noncritical reference surface approach.* (DTE Climatics/Thermal, Solar/Space Simulation)

**Bouclin, P.,** Test Tailoring in the 80's, No. 1, p. 13. *(Abstract—see Wright, C. E.)*

**Buck, R. A.,** Pneumatic Vibration for Stress Screening, No. 2, p. 50. *(Abstract—see Volirath, D. E.)*

## C

**Caruso, H.,** Tailoring for the Ultimate User, No. 1, p. 17. *An edited transcript of the Ultimate User Test Panel held at the 1982 Annual Technical Meeting of the Institute of Environmental Sciences. This was an open forum in which design and test engineers were able to learn first-hand the opinions of military hardware users regarding equipment reliability and suitability. Panel members included pilots and ground personnel from the Army, Navy, and Air Force. Areas discussed include deficiencies in product procurement policies, reliability and vendor image, field thermal environments, cooling airflow inadequacies, and maintenance/handling induced failures. Specific examples are cited by the panelists.* (PR Acquisition Policies; DTE Criteria and Standards, Climatics/Thermal, Test Tailoring)

**Chambers, L. C.,** The Navy's Operating Environment, No. 5, p. 32.*Keynote address from the 1983 Institute of Environmental Sciences' annual technical meeting. Relates environmental sciences and the operational realities of the US Navy. Shock and Vibration, Shipboard Clean Rooms, and Environmental Pollution issues are highlighted.* (DTE Shock and Vibration, Test Tailoring; CC Clean Room Design/Materials; EE Solid/Weapons Waste Management, Water Quality Impact)

**Choi, Y. H.,** Department of Defense Management of Hazardous Waste, No. 5, p. 13. *Describes the initiatives in establishing and enforcing strict controls on the cleanup, handling, transport, and disposal of hazardous wastes. DoD's installation restoration program represents a vigorous effort to identify, control, and clean up inactive or abandoned disposal sites. DoD also supports research and development to reduce and recycle its waste materials.* (EE Solid/Hazardous Waste Management, Environmental Planning)

## D

**Daniel, S. W.,** Industry/University Cooperative Research Activity: Particle Contamination in the Clean Room, No. 2, p. 33. *(Abstract—see Hoenig, S.)*

## E

**Edelstein, A.,** The NTS Test Bed for Novel HVAC Systems Evaluation, No. 5, p. 20. *Describes a novel test bed that has been constructed which is capable of testing heating, ventilating and air-conditioning systems to save peak power and/or energy as well as a particular HVAC system that is currently undergoing evaluation.* (EE Energy Production/Use)

## G

**Gleit, A.,** Coal as a Marine Boiler Fuel: Environmental Effects, No. 2, p. 41. *(Abstract—see Woodcock, B.)*

**Gott, J. S.,** Some Unique, Natural, High Ordnance Temperatures, No. 2, p. 26. *Data from three realistic exposure circumstances are presented to show maximum ordnance temperatures attained. The dispenser skin temperature of a Low Speed Fuel-Air-Explosive canister exposed unprotected in the desert at China Lake and the deck temperature of a diesel-electric submarine in dry-dock at Key West both approached the 71°C (160°F) level. The rocket motor skin temperature of a Tomahawk cruise missile in its Launcher reached 53°C (127°F) under relatively mild climatic conditions. Care is recommended in the application of such data to set program environmental design requirements.* (DTE Climatics/Thermal, Criteria and Standards, Test Tailoring)

**Greene, K.,** Reliability Standardization Program Management, No. 4, p. 31. *Provides an overview of the Reliability Standardization Document Program Plan developed to define, schedule, plan, and control reliability standardization activities within the scheduled milestones. It is the principle source of required management information to all levels of participation within DoD and industry. The plan provides an overall assessment of the status of reliability engineering documentation, including the scope, purpose, and schedule of planned projects, and the assignment of these projects to cognizant DoD components.* (PR Criteria and Standards, Acquisition Policies)

**Gupta, G.,** Energy, Environment and Economics: A Course in Energy Education, No. 2, p. 58. *An interdisciplinary course is proposed, integrating energy crisis aspects (and alternatives) with socioeconomic aspects of environmental degradation. This course gives university students a better understanding of the various problems (and possible solutions) involved.* (EE Education/Training)

## H

**Hoenig, S.,** Industry/University Cooperative Research Activity: Particle Contamination in the Clean Room, No. 2, p. 33. *Application of upstream corona discharge to prefilters of the type normally used in clean room laminar flow cabinets was investigated. Efficiency improvements from the usual 8% to 80% or better were observed with no increase in pressure drop. When applied to Filtrete™—efficiencies of 99.985% were observed with no increase in pressure drop. Other studies demonstrated that conventional air showers are relatively ineffective for removal of dust from the exterior of clean room garments. Air blown internally is rapid and very effective without requiring any special employee action other than connecting the air source. Also, clean room garment dust shedding and lint generation were studied.* (CC Clean Room Design/Materials, Filters/Filtration, Garments/Wipes)

**Hoenig, S.,** Industry/University Cooperative Research Activity: Contamination Control in the Clean Room, No. 5, p. 35. *Application of a bonnet-type hair dryer and a soft air-blown brush to remove contamination from employees' street clothes was investigated. Other test results indicate that mechanical systems used by wafer transfer operations generate about 1/10 of the dust produced by a human operator showed that cleaning fluids in clean room laundries may become contaminated with stray chemicals and particulates. These solutions must be carefully filtered after every use. The application of specialized plastic covers that exclude dust without interfering with employee use to conventional laminar flow cabinets was investigated. These systems have been demonstrated to be effective in at least one major semiconductor manufacturing company.* (CC Clean Room Design/Materials, Garments/Wipes, Filters/Filtration, Sources and Effects)

**Hung, R. J.,** Numerical Simulation of Fog Formation and Liquid Water Content on Polydisperse Multi-Composition Aerosols Due to Combustion-Related Pollutants, No. 1, p. 44. *Reports the results of investigations of the dynamic and microphysical process involved in the formation of advection fog on aerosols. The effects of a polydisperse aerosol distribution and a multi-composition aerosol species on the condensation/nucleation processes are of particular interest. The results show that an aerosol population with a high particle concentration provides more favorable conditions for the formation of a denser fog than an aerosol population with a larger particle size, if the value of the total mass concentration of the aerosols is kept constant. A numerical study of the effect of the aerosol particle size distribution on the wet removal nucleation processes shows that the the aerosol particle size distribution does not affect the amount of liquid water produced if the mass concentration of the aerosol particles is kept constant.* (EE Air Quality Impact, Energy Production/Use)

## L

**Laube, R. B.,** Methods to Assess the Success of Test Programs, No. 2, p. 54. *Describes two assessment methods for measuring the success of satellite test programs specified in MIL-STD-1540, "Test Requirements for Space Vehicles." Success is considered to be the ability of the test program to minimize orbital failures. The first method compares spacecraft failures on orbit with the thoroughness of the spacecraft test programs. The second method compares the fractions of total failures found by the test programs with the thoroughness of the spacecraft test programs.* (PR Acquisition Policies, Criteria and Standards; DTE Criteria and Standards, Solar/Space Simulation)

**Lesser, E. H.,** Environmental Requirements and Related Test Methods Standardization Program Management, No. 4, p. 33. *Summaries the Environmental Requirements and Related Test Methods (ENVR) Standardization Document Program Plan developed to define, schedule, plan and control the environmental standardization activities within DoD. The program plan addresses documents that relate to environmental engineering terms—natural and induced, design cri-*

*teria, and methods to determine attainment of the environmental design criteria.* (DTE Criteria and Standards; PR Criteria and Standards, Acquisition Policies)

**Liaw, G. S.,** Numerical Simulation of Fog Formation and Liquid Water Content on Polydisperse Multi-Composition Aerosols Due to Combustion-Related Pollutants, No. 1, p. 44. *(Abstract—see Hung, R. J.)*

**Lieberman, P.,** The NTS Test Bed for Novel HVAC Systems Evaluation, No. 5, p. 20. *(Abstract—see Edelstein, A.)*

## M

**Maher, G. G.,** Flocculation of Coals and Minerals by Starch Xanthate-Polyethylenimine Adducts, No. 3, p. 29. *Starch xanthates and polyethylenimines were studied as flocculants, each in varied amounts, alone or in combinations, for aqueous colloidal suspensions of coals, clays, and hematite in settling cylinders. Sedimentation rates and volumes and water clarity were observed with time. The coals and hematite flocculated quickly with either agent, resulting in compact sediment volumes and clear supernatant water. Combinations of the flocculants showed a synergistic enhancement. Clays did not flocculate as well, yield clear water always, or respond to the synergism. The xanthate's degree of substitution was not an apparent factor, but the molecular weight of the imine was.* (EE Water Quality Impact, Solid/Hazardous Waste Management)

**Meeks, S. L.,** On MTBF Projection From Reliability Test Data, No. 3, p. 16. *MIL-STD-781 encourages the practice of projecting field MTBF from reliability qualification test data once the equipment under test has been accepted. The practice of taking corrective actions or modifications and again submitting the equipment to test invalidates the use of the confidence limits currently used. The attempt to derive valid confidence limits indicates that reliability qualification testing is not an adequate methodology for some purposes of the standard. Reliability growth models are a possible alternative.* (PR Reliability Statistics, Acquisition Policies)

**Milenkovic, P.,** Discrete Section Synthesis of Acoustic Horns, No. 5, p. 39. *An acoustic horn is used to couple an air-blast noise source to a reverberant test chamber. The Sabine approximation gives a value for the acoustic loading of the chamber. This loading condition is used to specify both forward and inverse transformations between horn geometry and horn frequency response. The inverse method is used to improve the frequency response near cutoff over what is achieved by a horn derived from rule-of-thumb formulas.* (DTE Acoustics)

**MIL-STD-810** Goodbye Charlie, Hello Dolly, No. 5, p. 13. *An edited transcript of the session held at the 29th Annual Technical Meeting of the Institute of Environmental Sciences, April, 1983 in Los Angeles, CA. Presentations are made by government and industry experts involved in the preparation of MIL-STD-810D. The new General Requirements philosophy of test tailoring is discussed in depth. Specific modifications to dynamic and climatic test methods and procedures are detailed, along with descriptions of new and deleted methods. Audience questions and panel responses are included.* (DTE Criteria and Standards, Climatics/Thermal, Shock and Vibration, Test Tailoring; PR Acquisition Policies)

**Moddeman, W. E.,** Studies of Iron and Nickel Alloy Oxide Films and the Propensity for Surface Attraction of Atmospheric Hydrocarbon, No. 3, p. 13. *(Abstract—see Salerno, R. F.)*

## P

**Phillips, Q. T.,** Cosmetics in Clean Rooms, No. 5, p. 27. *Discusses cosmetic materials that may become a source of potential particle contamination in the manufacturing of electronic components. Analysis of cosmetic materials shows evidence of large numbers of particles which may be damaging to electronic components. These are usually transferred by air currents or by touch.* (CC Sources and Effects, Identification/Measurement)

## Q

**Quart, I.,** Screening Design Considerations, No. 1, p. 24. *Discusses how to plan an effective environmental stress screening regimen, screening objectives and amount of screening along with an evaluation of the relative effectiveness of temperature, vibration, and power cycling at various levels of assembly. Advantages and disadvantages of screening at part, module, unit and system levels are discussed.* (DTE Shock and Vibration; PR Stress Screening)

## R

**Recommended Practice For Gas-Phase Adsorber Cells,** No. 2, p. 60. *Covers the design and testing of a modular gas-phase adsorber cell for use in once-through or recirculating air cleaning systems where high efficiency removal of gaseous contaminants is a requirement. This practice covers two types of modular cells: (a) Type 1 Pleated-bed cells, and (b) Type II Flat-bed or tray type cells. Test requirements of this practice cover the cell as filled with 8-16 U.S. mesh activated carbon.* (CC Filters/Filtration, Criteria and Standards)

**Roderer, J. F.,** Contamination Control Education, No. 6, p. 35. *Provides an overview of the general considerations required for education programs in contamination control. Included factors are facilities, tools and processes, equipment, people, and garments and materials. Responsibility and operator motivation are highlighted.* (CC Training/Education)

**Roditi, S. I.,** AGMC Solvent Reclamation (Trichlorotrifluoroethane), No. 4, p. 24. *(Abstract—see Swope, R. F.)*

**Ruckelshaus, W. D.,** Science, Risk and Public Policy, No. 4, p. 28. *A penetrating analysis of the problems faced by the Environmental Protection Agency in assessing health risks of environmental pollution. Difficulties in relating clear legislation to complex scientific issues are highlighted. The need to better involve the citizen in such issues is identified.* (EE Environmental Planning)

## S

**Salerno, R. F.,** Studies of Iron and Nickel Alloy Oxide Films and the Propensity for the Surface Attraction of Atmospheric Hydrocarbon, No. 3, p. 13. *Iron and nickel alloys containing varying percentages of iron, nickel, chromium, and molybdenum were characterized for surface composition and oxide thickness using Auger electron spectroscopy after the following low temperature surface treatments: 1) ultrasonic cleaning in organic solvents; 2) exposure to argon plasma; 3) exposure to oxygen plasma. The results show oxide thickness increased in the following order: solvent cleaned < argon plasma cleaned < oxygen plasma cleaned. Argon and oxygen plasma cleaned samples had a pronounced iron and nickel enrichment in the surface oxide, and a chomium enrichment at the oxide/metal interface. All samples with thick oxides showed the least propensity for build up of atmospheric hydrocarbon and are discussed in terms of thermodynamic and transport properties of transition metal oxides.* (CC Identification/Measurement)

**Siekmann, R. O.,** Features and Testing of Clean Room Apparel, No. 1, p. 36. *With the demanding requirements of recent particulate sensitive products such as those in the electronics industry come the advent of more sophisticated clean room design. To complete the matrix, clean room garments and associate test to verify their performance need to advance. Widely recognized is an acknowledgement that the proper characterization of such a garment's performance should deal with more than the current standard of cleanliness. In order to support advancing user requirements and needs, this paper provides a summary of the features to be considered and methods to evaluate them. Of particular interest are three new tests developed to evaluate apparent and effective cleanliness.* (CC Garments/Wipes, Identification/Measurement, Sources/and effects)

**Smith, R. E.,** Numerical Simulation of Fog Formation and Liquid Water Content on Polydisperse Multi-Composition Aerosols Due to Combustion-Related Pollutants, No. 1, p. 44. *(Abstract—see Hung, R. J.)*

**Sullivan, D.,** Coal as a Marine Boiler Fuel: Environmental Effects, No. 2, p. 41. *(Abstract—see Woodcock, B.)*

**Swope, R. F.,** AGMC Solvent Reclamation (Trichlorotrifluoroethane), No. 4, p. 24. *Documents events that led to the Aerospace Guidance and Metrology Center's acquisition of a trichlorotrifluoroethane solvent reclamation system and also presents a general overview of the system which provides Newark Air Force Station with a continuous batch distillation system for the purpose of reclaiming used contaminated trichlorotrifluoroethane to Military Specification MIL-C-81302B Type 1.* (CC Filters/Filtration; EE Solid/Hazardous Waste Management)

## T

**Thatcher, W. D.,** Electronic Housing Design for a Random Vibration Environment, No. 2, p. 29. *Highlights the activities involved in the design of a 196N (44-pound) receiver with a requirement to survive a 21 Grms random vibration environment. The method used to establish design criteria is described and the structural analyses techniques are shown. Design verification test data is presented for both the dynamic test model and the qualification test model.* (DTE Shock and Vibration)

**Turner, R. E.,** Environmental Criteria Guidelines for Aerospace Vehicle Design. No. 5, p. 24. *Discusses the philosophy used in the development of natural environment criteria and describes the two major criteria guidelines documents prepared to support the criteria development activities. The natural environment plays an important role in the design of aerospace vehicles to ensure the operational capabilities are met in an efficient and economical manner. The criteria must be specified to agree with the operational requirements for the system under development.* (DTE Criteria and Standards, Climatics/Thermal)

## V

**Vaughan, W. W.,** Environmental Criteria Guidelines for Aerospace Vehicle Design, No. 5, p. 24. *(Abstract—see Turner, R. E.)*

**Vo-Dinh, T.,** Surface Detection of Contamination: Principles, Applications and Recent Developments, No. 1, p. 40. *Presents the basic principles of luminescence spectroscopy used to detect trace organic substances on surfaces and some examples of application related to surface luminescence detection. These applications include the analysis of a synthetic fuel sample spotted on filter paper, the study of the adsorption process of a tumorigenic fossil-fuel material into mouse skin, the quantification of various coal liquids by sensitized fluorescence measurements, and the detection of potentially hazardous polyaromatic hydrocarbons by a sensitive surface detection technique, room temperature phosphorescence (RTP).* (CC Identification/Measurement; EE Solid/Hazardous Waste Management)

**Vollrath, D. E.,** Pneumatic Vibration for Stress Screening, No. 2, p. 50. *Describes the introduction of pneumatic triaxial vibration equipment at Rockwell International for environmental stress screening. The discussion covers the initial justification, cost savings, test levels and duration, noise level measurements, calibration techniques, production, and personnel education problems.* (DTE Shock and Vibration, PR Stress Screening)

## W

**Wagner, J. F.,** Macroencapsulation of Electronic Circuits, No. 2, p. 23. *Overview of the problems associated with the conformal coating of electronic circuits. A process identified by the USAF Productivity, Reliability, Availability and Maintainability (PRAM) Program Office called macroencapsulation which solves most of the problems associated with conformal coatings is described. Evaluation results show that the process provides an excellent moisture barrier, high dielectric strength, is easily applied at low cost, and can be readily removed with conventional solvents.* (DTE Climatics/Thermal)

**Washington, G. J.,** Cosmetics in Clean Rooms, No. 5, p. 27. *(Abstract—see Phillips, Q. T.)*

**Wegrich, R. D.,** Precise Thermal Control Test Demonstration on Simulated Space Telescope Main Ring, No. 4, p. 17. *(Abstract—see Bettini, R. G.)*

**Wittberg, T. N.,** Studies of Iron and Nickel Alloy Oxide Films and the Propensity for the Surface Attraction of Atmospheric Hydrocarbon, No. 3, p. 13. *(Abstract—see Salerno, R. F.)*

**Wittendorfer, K.,** Environmental Synergisms in the Performance Assessment of Armament Electrical Connectors, No. 3, p. 19. *Discusses three basic concepts as they apply to environmental testing of the electrical connector that is recommended for use with the MIL-STD-1760 Aircraft Store Electrical Interconnection System. These concepts are structuring the sequence of the individual environmental stresses to permit synergistic effects; modifying certain individual tests for added realism; and tailoring extremes of test parameters to the test items in its operational configuration at levels defined by acceptable cumulative probabilities of occurrence.* (DTE Criteria and Standards, Climatics/Thermal, Test Tailoring)

**Woodcock, B.,** Coal as a Marine Boiler Fuel: Environmental Effects, No. 2, p. 41. *Prepared to provide a first-cut analysis for the U.S. Maritime Administration of the potential environmental effects that may be associated with an increased population of coal-fired ships. The analysis was performed under the assumption that changes in shipboard fuel usage may occur if the cost of petroleum-derived fuels continues to rise relative to the cost of coal. The environmental effects that may occur under a specified coal-fired ship scenario were estimated. The ship scenario was broken down by port, ship size, etc. Six types of coals were analyzed. Air and water quality modeling was performed. It was found that there is a potential for adverse impacts on both air and water quality in the port areas.* (EE Energy Production/Use, Air Quality Impact, Water Quality Impact)

**Wright, C. E.,** Test Tailoring in the 80's, No. 1, p. 13. *Discusses the application of test tailoring by the Naval Weapons Center to the Sparrow AIM/RIM-7M air-to-air missile test program. Humidity, moisture intrusion, and captive flight vibration environments are analyzed and test criteria derived. Also, measured vibration levels for a free-fall device are compared with test levels derived from MIL-STD-810C.* (DTE Criteria and Standards, Shock and Vibration, Test Tailoring)